Magical Machines

About the book:
This book contains five stories wherein children can understand the working of simple machines like levers, inclined plane, wedges, wheel and axle and pulleys. Life skills are duly stressed wherever required. There is adequate emphasis on analytic skills and problem solving. One of the stories “Priya in Lever Land” has been published in the magazine Teacher Plus as part of their Primary Pack series.

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Chapter One

Priya in Lever Land

Priya was a little girl who lived in Vidyanagar. The next few days were days of excitement for Priya. You see, her tenth birthday was fast approaching. This time she was expecting her cousins from the city to join her. Mona, Aden and Seon had all said that they would surely come to her birthday party. “Maa, please bake a walnut cake. And for dinner, I would love some *aloo parathas*!”

When Priya’s birthday arrived, she could barely wait for it to be 6 p.m ---party time. Aunt Tina had said that they would be there by 5 p.m. Priya’s mother insisted that she sleep for a while in the

afternoon. But hardly had Priya shut her eyes when she heard a din. It seemed to come from the kitchen. Slowly she tiptoed to the kitchen and true enough the din did come from there.

“You must all agree that I am the greatest! After all I let the walnut cake in to be baked” shouted Darwazelal, the door of the oven.

“Oye Darwazelal, if I had not to assist, Priya’s mother would never have cracked the walnuts for the cake. Imagine a walnut cake without walnuts!” retorted Nutkhat the nutcracker.

“Well Nutkhat, all you do is something mischievous like cracking some one. I am important here because I helped to cut open the packets of flour” screamed Katribai, the kitchen scissors.

“Katribai, you are known to cut others with your sharp arms. But I don’t do destructive work like that you know. I mould shapeless dough into the most perfect circles. If not for me, Priya would not have had her favourite *aloo parathas* today” answered Chotti the roti maker.

Immediately Toaster the Boaster bellowed “Chotti, I think Priya will prefer the crispy toasts that I have generated….” Without giving him a chance to complete, Pehelwan Pakkad flexed his muscles and said “Sit quiet Chotti and Pehelwan. Both of you remember that the hot parathas and the toasts need me to handle them. Priya’s mother would constantly have burnt her fingers if I didn’t exist.” Suddenly all of them heard a giggle. It was Chammach Chachi the spoon. “Listen, if it hadn’t been for me, Priya’s mother could not have opened any of the storage tins.”

The next moment all were quiet. They noticed that while they were all fighting over whose contribution was the most important; Tarazu Tauji sat most serenely in one corner. Chammach Chachi broke the silence “Tauji, why are you so quiet? Who do you think is the greatest? Give us your opinion, Oh Sir. After all, there is no one with a balanced mind like yours” “Yes, besides, you are an epitome of justice. Your verdict shall be final. Speak out your thoughts, dear

Tarazu Tauji" quipped in Pakkad Pehlwan.
"Well thanks for all your compliments. But I really do not know what to say to all of you. Don't you realize that you are all from one family and fighting like this is unbecoming of you all?" "One family? We are all brothers and sisters. Impossible! How can some one as boastful as Toaster be my brother? Or how can that sharp tongued scissors be even distantly related to some one as cultured as myself?" asked Chotti, the roti maker.

"Well, all of you, sorry all of **us**, come from the family of levers. Look closely at ourselves. We all have a fulcrum. It gives us our balance"

"Hey I found my fulcrum. Here is it, the spot where my blades meet". That Eureka moment exclamation came from Katribai. (She was sharp when it came to understanding how things work.) Very soon, Darwazelal discovered that his hinges were his fulcrum. Pakkad Pehelwan, Chotti the roti maker, Nutkhat the nut cracker--- all found their

fulcrum. “I realize this is where our balance lies. This is the steady point that helps us work.” All this while, Chammach Chachi was quiet. “Don’t worry Chachi, you too are from our family. Very soon I will help you find your fulcrum” assured Tarazu Tauji.

Tauji solemnly continued “…and then we all have two more important aspects- a load and an effort. The work you do depends on where the load is. The effort is something that a person applies to get the work done.” “Yes my load is in the centre. The dough is shaped into a ball and placed at my centre and then Priya’s mother presses this handle, so I suppose that is the effort” attempted Chotti. “That’s right!” confirmed Tauji.

“My load is at the spot where the nuts are placed and when some one presses the handles, I presume effort is being applied” “Well the same goes for me too. Without an effort applied to me, I could not be possibly be shut” said Darwazelal.

“Absolutely right!” said Tauji “But then our load, effort and fulcrum are at different places. In my case, or in the

case of Katribai and Pakkad Pehelwan, the fulcrum is at the centre and the load and effort are on either side. We are called first order levers. In case of Chotti, the roti maker, the load is between the effort and the fulcrum. And so is it with Darwazelal. They are called second order levers. So you see I don't think it is right to be fighting over who is the greatest. In our own way, we are all great as we can make difficult work easy."

"Do I belong to your family?" whined Chammach Chachi. "Of course you do. Let me explain" said Tauji. "When Priya's mother uses you to open a tightly fixed lid, the end in her hand is where she applies an effort. You exert pressure on the lid. That is the load." "I get it" screamed Chachi "One part of my body takes support on the lid. That is my fulcrum, right?" "Now you get it. So you too are related to us. With her fulcrum between her load and effort, Chachi is …" Without waiting for Tauji to complete, the rest shouted in unison "….. a first order lever." "Oh Ain't I glad to be related to a level headed and just

person like you, Tarazu Tauji?" said Chachi.

Tauji smiled and said "In fact, we have some more relatives, where the effort is in between the fulcrum and the load. They are called third order levers. For example, the fishing rod that Priya's father uses has the load at one end, where the fish is caught. The fulcrum is his elbow where the balance is maintained and the effort is exerted by his forearm. We levers are extremely useful and help humans do their work easily. We are also classified as simple machines"
"I wonder, if I am in alien land!" That was Khulja Tim Tim, the bottle opener. One would think he was permanently yawning.

"Oh no, you are no alien, you are a second order lever with your load between your effort and fulcrum."

"Who is a second order lever, Priya? I think you are dreaming. Get up, it is nearly four o'clock. Your friends Brainy and Brawny are already here. In a short

while your cousins will be here. And then we will have a lovely party."

Priya woke up with a smile on her face. What a strange dream! But how very informative! She went to the kitchen. Khulja Tim Tim gave her a wide mouthed smile. Katribai too had her blades apart. Pehelwan Pakkad had stretched his muscular arms. Tarazu Tauji was swaying a bit. Chammach Chachi stirred slightly. She listened carefully. They were all humming "Happy Birthday dear Priya." "Thank you folks for the birthday wishes and thanks for assisting mother in the kitchen! Thank You for teaching me never to underestimate anyone. I realize that all of us with our virtues and assets can make this world a better place. You have made my day." They continued to sing "Happy Birthday" and Priya could assure you that she wasn't dreaming now!

Chapter Two
Inclined Planes

Priya’s father had purchased a new motorcycle. He had promised Priya a trip to Funland during the vacation. The road to Funland was just the right kind of road to try the new bike. “Sunday will be the right day to go there” said Priya’s dad. “Could Aden, Seon and Mona come too?” asked Priya.They were Priya’s cousins who had stayed on after Priya’s birthday. “No problem, if their dad agrees to get them. I can just take one person as a pillion rider, you know! I think if Uncle Sunil agrees to get the car along, we can take Brainy and Brawny too.” “Wow, that’s wonderful. The more the merrier” exclaimed Priya

The following Sunday, Priya and her father took their bike along. Uncle Sunil drove behind with Mona, Aden, Brainy and Brawny.

The road to Funland was uphill. Priya looked at the road closely. “Daddy, why is this road all curved?” “Well, this is a slope that we are ascending. It is easier to go up a slope, if the road is winding. That way the power exerted by the engine of the vehicle is low and even low

powered vehicles as bicycles can go up. It may take slightly longer, but it is les labourious. This is the principle of an inclined plane" explained Dad.

"An inclined plane?" thought Priya. Almost immediately, she heard a little voice "If you have the inclination, I have the time. I will teach you all about inclined planes once we get to Funland." That was the road talking! "Don't be surprised, Priya. I am the road. Yes, I will follow you right up to Funland and show you many interesting things on the way."

Very soon Priya and her father reached Funland. Uncle Sunil and the rest were already there. They bought their tickets and headed to the play area. Seon and Aden ran towards the slides. "Priya, this slide is an inclined plane. Watch how your cousins slide down without much effort. Had this slide been flat that would be impossible. A plane is a flat surface. For example, a smooth board is a plane. Now, if the plane is lying flat on the ground, it isn't likely to help you do work. However, when that plane is inclined, or slanted, it can help you move

objects across distances. And, that's work!” explained the road.

Next Priya joined her cousins and enjoyed a few rides down the slide. Her little cousin Mona preferred jumping on and off the steps. “Hey Mona, come here. These slides are fun.” “The steps are fun, too.They too are an example of an inclined plane” said the road to Priya. “How can that be? They don’t seem plane to me at all.” countered Priya. “Well, if you had to climb from one level to another up a wall, like Spiderman, would that be easy?” “Easy for Spiderman, not for me” said Priya. “Exactly, to help you climb walls easily, you have these steps. Watch carefully. The flight of steps is actually a flat surface set at an angle against a horizontal surface. Only thing it is at different levels so as to make climbing easy. The steps help you move from a lower level to a higher level by cutting a little space into the incline to make it easier for you to use.” explained the road.

“Oh Yes I get your point. But dear Mr. Road, I need to say bye to you for now

because I see my cousins are having fun on the roller coaster. Bye."
"Bye Priya. Enjoy yourself on the roller coaster. But I am sure you will think of me even there."
Priya joined her cousins on the roller coaster. It was a huge, monstrous coaster, so her father decided to sit along with the children.

Priya screamed aloud as the coaster slid, twisted and turned. As she did so, she thought "I wonder if this is an inclined plane too! It surely is at an angle with the horizontal." "Yeah, now you are thinking like a true scientist by applying what you have learnt. Good! Well, the roller coaster is indeed an inclined plane!" True to his word, Mr. Road was there, helping Priya understand more about inclined planes. "In the simplest form, the coaster is just an inclined plane, in which a force is applied to push a block up the plane and then released and allowed to slide back down the plane" continued Mr. Road.

By now the sun had come nearly overhead and Uncle Sunil suggested that they should have some thing cool.

“Yippee, I will have some ice-cream” said Mona. “We will have some *lassi*” shouted Brainy and Brawny. And off marched the giggling gang to the cafeteria. At the entrance of the cafeteria, they saw a little girl on a wheelchair. “How will she get to the cafeteria?” asked Priya. Before anyone could say anything, Brawny marched up to her and offered to lift her up the stairs. (He was always confident of his strength.) “Wait, Brawny, there is no need to do that.” said Brainy. “What do you mean? It is our duty to help the handicapped.” retorted Brawny. “Yes of course. But you need not use your muscles for that. Do you see that ramp over there? The wheelchair will easily go up the ramp. We may just need to be behind the wheelchair to provide help if required.” So all of them accompanied the girl in the chair to the ramp and she easily rolled up the ramp with the twins holding the back of the chair. “Oh thank you” said the girl. “You are most welcome” replied Brainy. “In fact we would be pleased if you joined us for some refreshments”. All this while Priya was thinking “Now wasn’t that an inclined plane too?” ‘Yes my dear. You

are thinking right” Mr. Road reinforced her thoughts.

The children found a new friend. The girl in the wheelchair---her name was Trupti. She loved drawing and painting. Soon Trupti’s parents joined them. Over their glasses of cool drinks and some snacks, they introduced themselves and exchanged their contact numbers, promising to keep in touch. When Priya went to wash her hands, she realized that the wash basin was an inclined plane as well. It allowed the water to go into the drain pipe easily.

After refreshments, Uncle Sunil suggested that they should now enjoy themselves at the indoor theme park as the outdoor park was getting hot. So off marched the group to the indoor park and the first thing that met their sight was a giant snow world. Excitedly, they got into a set of warm clothes and entered a room that resembled the tundra region. There was an igloo, a sledge, a snowman, some reindeer statues and yes.. it was snowing. Brrrr! It was cold too. Priya and Mona got into a sledge. It has no wheels and could

slide on the snow. All of a sudden they found themselves on a slope and whoop came the sledge sliding down. Another inclined plane! Wow, this is fun, thought Priya.

The children thoroughly enjoyed themselves and returned home at five that evening. Priya's father had to put his motorcycle up on the verandah. To do this, he placed a strong plank over the steps and carefully slid the motor cycle up to the verandah. "Uncle, that's easy work. I was just wondering how you would take that heavy bike up!" remarked Brawny. Priya's father answered "Brawny, that's smart work. The ramp that I just used is …" "… a simple machine called as an inclined plane" completed Priya. "Exactly. Do you know Priya, these inclined planes were used extensively during the construction of pyramids?" added her father.

"Oh Uncle, do tell us how" said Brainy. Priya's father continued "The pyramids in Egypt are made of huge stone blocks. For years people have been wondering how they moved all those heavy blocks around. The best guess is the Egyptians

pushed the blocks up inclined planes in order to build the pyramids. Earthen ramps were used at least in the initial stages of construction. Ramps have been found at the pyramids of Amenemhat I and Senwosret I at Lisht as well as at several other sites. Traces of disassembled ramps at pyramid sites are even more common. The ramps were made of brick or earth and rubble dressed with brick for strength. They were built up as the pyramid progressed upward, and removed as the pyramid was finished downward."

Priya realized that simple machines were used effectively in ancient times as well. The visit to Funland was enjoyable. She had a great time with her cousins, found a new friend in Trupti, learned so much about inclined planes. Truly, science is all around us. If only we can see and perceive, it is all so meaningful. Priya slept soundly that night. Before she went off to sleep, a crazy thought came to her mind… what if the bed was an inclined plane! Just imagine…. That would be fun, wouldn't it?

Chapter Three
Wondrous Wedges

Priya's Science teacher had given the class a strange assignment. Each student had to interview an article of daily use. Priya had to interview a knife. Now, have you ever done an assignment like that? But who could question Ms. Vidnyani? So that evening, Priya took her notebook and pen and set off to interview a knife. She took Brainy and Brawny for company. Priya had already sought the necessary permissions from her mother, who owned a set of kitchen knives.

At the appointed hour, when Priya reached the dining table, all the knives were in their shining best, their blades gleaming and their handles clean.

Priya: Errrr…. Good evening,Mr…

Tejbahadur: Oh Hello, I am Mr Tejbahadur.

(That was the biggest knife of the lot)

Tejbahadur: And this is my better half Mrs. Tejbahadur. These are our relatives Mr. Suri and Miss Cutrina.

Priya: Oh I am pleased to meet you. I am Priya. I am a student and my teacher has asked me to interview you. And these are my friends Brainy and Brawny.

Tejbahadur: Nice meeting all of you. Just shoot your questions and we will give you the answers. We are quite sharp. So I suppose we can answer every question of yours.

Priya: Well, first of all tell me, why you are classified as machines? I see no moving parts as we have in sewing machines or other machines.

Mrs Tejbahadur: I'll take that first question. You see Priya, any thing that makes your work easy by performing a task by transforming energy, between the force applied and the distance over which it's applied is a machine. Oh was that too complicated? Okay, when you use a knife to cut, you apply force, right? All simple machines have this force applied to make some task easy. And

that classifies us as simple machines. I wonder, if you have met my cousin, the inclined plane. Actually a knife is nothing but an inclined plane.

Brawny: Are knives the only example in your type?

Miss Cutrina: When two inclined planes meet, they form a sharp edge, which is used for splitting, cutting, holding and dividing objects. It is triangular in shape. Such a combination has a special name. We are called Wedges. To imagine a wedge, just think of two inclined planes joined together. A knife is a wedge. Forks, axes or even your teeth work on the principle of a wedge.

Mr. Suri: A wedge may be pierced into an object to prevent it from moving. Sometimes it is used to split an object into pieces. So you see, sometimes we unite, sometimes we divide.

Brainy: How is it that some knives need a greater force to be applied for cutting?

Tejbahadur: Force multiplication varies inversely with the size of the wedge

angle. Let’s make that simpler. A sharp wedge (small inclined angle) yields a large force. A blunt knife or a blunt axe has a wide wedge giving it a small splitting force.

Miss Cutrina: I think we have told you a lot about ourselves. But I must tell you something more. You humans have devised several phrases and proverbs using our names. For example, you use words as a double edged sword which means ‘a situation that can have both favourable and unfavourable consequences’

Tejbahadur: I have a few more for you. ‘Cutting like a knife would cut butter’ means an easy job. ‘To have your knife on somebody’ means ‘to cause problems for someone because you do not like them’. If a person or organization is on a knife-edge, it means they are in a difficult situation and are worried about what will happen in the future. ‘To turn or twist the knife’ means ‘to do or say something unpleasant which makes someone who is already upset feel worse’.

Mr. Suri: If you drive a wedge between two people or two groups of people, you do something which spoils their relationship. The phrase ‘the thin end of a wedge’ means ‘the start of a harmful development’.

Tejbahadur: I wish to add something. Humans often use us for wrong purposes as killing or harming. Our friend the axe, who is also a wedge, feels very bad when he has to cut a green and healthy tree. He feels worth it, if he is used to help a mountaineer get up a steep slope. So could you please pass this message to your friends? Please use us constructively and we will be most glad to serve you.

Priya: Oh Sure. I will do my best. Thank you so much for teaching me all about wedges. I also enriched my vocabulary. Ms. Vidnyani is going to be more than pleased.

A thoroughly happy Priya neatly wrote down her interview and took it to the Science class. If you want to know the impact it had on Ms. Vidnyani, you have

to read the next chapter and get ready for some really exciting adventures.

Chapter Four
Wheel and Axle

Ms. Vidnyani was more than pleased with the work of her students. All of them had done a great job in interviewing household articles. So she organized a ‘free period’ for them. But the class knew that a free class with their science teacher would mean some surprise. The surprise was she had organized a treasure hunt for the class. All she did, during the next science class to lead them to a big hall full of artifacts and statues. She just gave them one clue. “Meet Kaikeyi.” “Kaikeyi from the Ramayana?” asked Saahil. But Ms. Vidnyani just smiled and left the hall. “Well friends, since Kaikeyi from the Ramayana is the only Kaikeyi we know, let’s go.”

The class split into four groups of five students and took up one wall each to scour. They scrambled through books,

clothes and artifacts when suddenly Styner's team shouted "Hey, we found the Ramayana." As they opened the big book, there tumbled a picture of a queen with a wheel in her hand. The picture had a letter for them

"Hello Class,
I am Kaikeyi, wife of King Dashratha. I often accompanied the King on his campaigns. Once, the wheel of the King's chariot came off. Imagine riding without a wheel! I then put my finger into the axle and the wheel kept rotating. You know that every wheel has a circular part that moves. The axle is the smaller circle at its centre. The king was pleased and granted me a boon. I later on asked him to send Ram to the forest and make my son Bharat the king. Well I did regret that later. I realized that the most important thing in life is peace….. But that's a long story. Right now, I just give you your next clue. Find another man from history who also thinks that peace is very important. In fact he underwent a sea change in his attitude after a terrible war. All the best!"

The letter ended there and so the class had no choice but to look out for ‘the man who changed after a terrible war’. “That one is easy” said Rhea “It has to be Emperor Ashoka”. It was easy to guess his name but they took some time to find the related clue till Paras and Manas shouted out “Look the chakra on the flag has something on it.” As they pulled the paper on the flag, they found their answer “I am the Dharma Chakra. Emperor Ashoka is credited with this chakra. Some say it represented the chariot wheel which was transformed to the wheel of justice after his transformation at Kalinga. The wheel always tells you to keep progressing. The Buddhists have accepted the Dharmachakra as their divine symbol. Now please move on to a wheel that contributed to our freedom movement.”

“The wheel that contributed to our freedom movement…..” Rhea pronounced each word loud and clear for all to hear. “Well, it must be Gandhiji’s chakra” and so all dashed to look out for a spinning wheel. In one corner of the room was a spinning

wheel. Rhea and Saahil called out to the class “Hey. We have found our clue.” It says “Gandhiji introduced spinning as an activity during the Non Co-operation Movement. It was meant to revive Indian industries and encourage the use of swadeshi. The British industries received a blow due to this movement. Gandhiji himself used to spin daily. A spinning wheel has a wheel and an axle like all other wheels.” The spinning wheel had a small note attached to the axle. It said “Go to the vehicle corner and learn how wheels and axles move”.

So off dashed the class to the vehicle corner. There were models of trucks, cars, horse carts and other vehicles. Relcy found a little piece of paper in one of the trucks “Could this be our clue?” She opened it carefully and read out “There are two main ways to use a wheel and axle. The first way is by wrapping a rope around a supported wheel with a lever sticking out. An object can be tied to the other end. By turning the lever, the rope either moves the object toward or away from you. The second way is by having two wheels at the end of an axle. The wheels will then roll providing

movement. Because the wheel is larger than the axle, it always moves through a greater distance than the axle."

The class now realized how a wheel is a simple machine. Relcy went on further "And now to find some more complex wheels, just look at the time." "What a funny clue! How can the time tell us about complex wheels?" blurted Paras. All were quiet. The only sound you could hear was the ticking of the grandfather clock. Manas, who was noted for his quick thinking, walked to the clock and checked it. "Dash to the clock everyone. I have found a clue." It says "All clocks have wheels which are interlocked and they move in two opposite directions. Such wheels are called gears."

"Now dear children, you have learnt quite a lot about wheels, axles and gears. For completing your treasure hunt in record time, a treat awaits you. So just move on to the right door, the door that uses a wheel to open it. A bus will be waiting for you" The class dashed off to look out for the right door. "It can't be this one. This one has a latch" said Ujwala. "And neither can it be this one.

This one has a latch and a bolt" added Saurav. "Hey. I found the right door. It has a knob and a knob is a wheel on an axle" shouted Styner. Right enough, as soon as they opened the door, they saw a bus waiting for them.

They clambered on to the bus. And who do you think was driving the bus? Well, you are right. It was Ms Vidnyani herself. "Well done children, you truly have used your analytic minds and successfully completed your treasure hunt. You deserve a treat". And so saying she drove them to the nearest ice cream parlour. That was exciting wasn't it?

Chapter Five
Pulley Power

One hot summer day, Priya was helping her mother draw water from the well. The water level had gone quite low and it was tiring to draw the water. The twins wanted Priya to play with them. "Let me help Maa for a while and then I will surely join the two of you" she said. "At the rate at which you are drawing water, it's going to take us too long.

Here let me help you" said Brawny and he immediately took the pail from Priya's hands. But hardly had he pulled a couple of pails from the well, when he panted "Yeah. This is toooo tiring. I guess after this we will have no strength to play. Hey Brainy. Help us by drawing some water from the well" Brainy said "Help I sure will render. But to a machine this work we surrender!" (You see, dear friends, Brainy was good at rhymes.)

Off went Brainy and sought the help of the village carpenter. He drew a few figures on a sheet of paper and by evening a small little aid was fixed on the well.

He called Priya, her parents and a few others to give them a full fledged demonstration. "What's this and what does it do?" "How will it work?" Brainy said he would answer all questions after a demonstration and he just turned a small spike and in a jiffy, with the least effort, a pail of water came up." A number of Ooohs and Aahs were heard. Brainy then said "This, dear friends, is a pulley. All we have here is a wheel and a rope. A ***pulley*** is a rope wrapped around a wheel. It can lower or lift a load. The

muscular force applied is called as ***effort***. The pail of water is the ***load***. The wheel helps to reduce the effort required to draw up the load. Most machines used for lifting, such as cranes, have sets of pulleys that magnify the effort."

"That's great! My work will get done faster and more easily. Thank you so much Brainy. You truly are a genius!" exclaimed Priya's mother. "My pleasure to help you, Auntie! Actually, I always believe that a scientific attitude helps in solving problems with poise and calm. Even our Science teacher tells us that" said Brainy.

Later that day, the three friends went to their library to find more about pulleys and each one came up with matter to share with one another.

Brawny: The origin of pulleys is not known, but there is evidence that they were used in the building of Stonehenge, in England. One of the first names we associate with pulleys is that of Archimedes, a famous Greek scientist born in Syracuse (a Greek seaport

colony). Archimedes studied many areas of science and invented many devices, and it is said that he used pulleys to drag a ship out of the ocean and onto land.

Priya: Sailing ships use pulleys to lift the heavy sails up the mast. A six pulley system meant that a sailor weighing 80 kilograms could lift a sail 6 times the weight of the sailor. That is he could lift 480 Kg. Lifting cargo into the haul of the ship was heavy work made increasingly lighter by the use of pulleys.

Brainy: A combination of pulleys is called as a block and tackle system. Lifts in high rise buildings use this mechanism. A clothes line makes use of a pulley. Window blinds can be rolled and unrolled with pulleys. Flags can be hoisted by means of a pulley. Cranes use pulleys to lift heavy objects. Actually, we can make a few toys using the principle of a pulley. Hey that’s a great idea. We could spend our weekend fruitfully by making some toys based on scientific principles.

The three children had something interesting for the weekend that

followed. They made models of a lift using a system of pulleys. Why don't you join them and enjoy your weekend similarly?

Some exciting facts about simple machines:

- Archimedes devised some simple machines and used them to build compound machines. When he was in Egypt he designed what is known as the "Archimedes' screw". It could be used to draw mass quantities of water from lakes or rivers. He built a system of levers and pulleys that could be used to launch huge and fully loaded ships in water. It is said that King Hiero was so impressed with Archimedes's machines that he issued a proclamation saying that "Archimedes is to be believed in everything he says." When Syracuse was attacked by Romans, the king once again went to Archimedes for help. Archimedes designed machines and

contraptions that sent Roman soldiers running in panic. He designed cranes that would grapple the Roman ships and then destroy them by raising them in the air and smashing them in the water. He built catapults that would hurl huge stones at the enemy. Legend credits Archimedes with saying, "With a big enough lever, you can move the world."

- Did you know a manual can-opener is made of 3 simple machines? The handle you turn to make the can rotate is a wheel and axle. The two long arms that clamp the can securely make a lever. The circular wheel that cuts the can lid is sharpened to make a wedge.

- The inclined plane and rollers were used in building the Pyramids in Egypt. Ramps over one mile long were used to move and place 2.5 million limestone blocks weighing up to 70 tons each.

- Early wheels probably evolved from log rollers used to aid the progress of a heavily laden sled or a stone block, a slice of log attached solidly to an axle giving way to a crude disc wheel revolving on a fixed axle. Spokes were introduced about 2000 BC in Middle Eastern regions, an improvement that lightened the structure and provided levers to propel the vehicle when necessary.

- In parts of the world where there were no draught animals, including North and South America, the wheel and axle never evolved, their use being introduced through European trade and settlement.

- Most early disc wheels are found during the Bronze Age, but a Neolithic (New Stone Age)

example discovered in the Netherlands indicates that metal tools were not required for their development or construction. In Britain nave bands, part of the construction of the wheel hub, have been uncovered from a late Bronze Age hoard in Heathery Burn Cave, Durham, northeastern England. The wheeled cart existed in Mesopotamia about 3000 BC, but did not occur in Egypt before 1600 BC.

- Wheel-thrown pots are first found in Mesopotamia, although it is likely that the potter's wheel was invented before 3000 BC

Hope you enjoyed your journey with simple machines. What if you were to invent a machine? What kind of a machine would you invent? How would it benefit mankind? Draw a picture of your invention and think about how you can achieve your goal. All the best!

References:
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